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B8N NKB N505

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(54) Metered fluid dispenser

(57) A fluid dispenser has a plurality of chambers 8, 9 of predetermined capacity which can rotate about coaxial tubes 2, 3, each tube having a single port 5, 6 in its side wall positioned so that when one port is aligned with one chamber the other port is aligned with another chamber, the first tube 2 being connected to a supply reservoir 14 and the second tube 3 forming the discharge vent 25 of the dispenser. The dispenser is actuated by a trigger 15 having a rack (18, figure 2A) acting on a cog 17 serving to rotate the chambers 8, 9.

FIGURE 1A

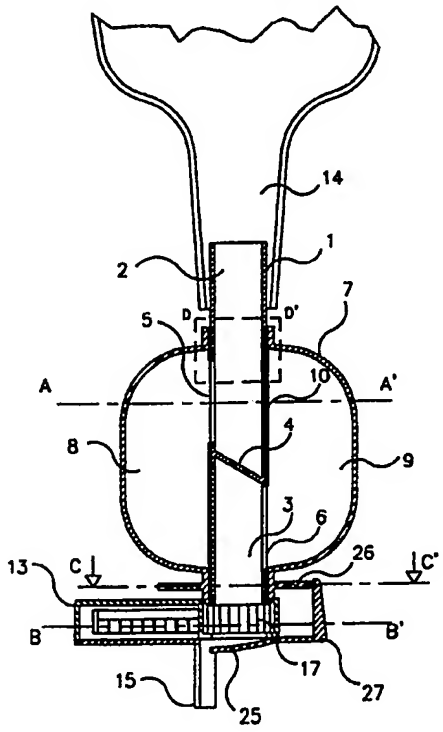

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FIGURE 1A

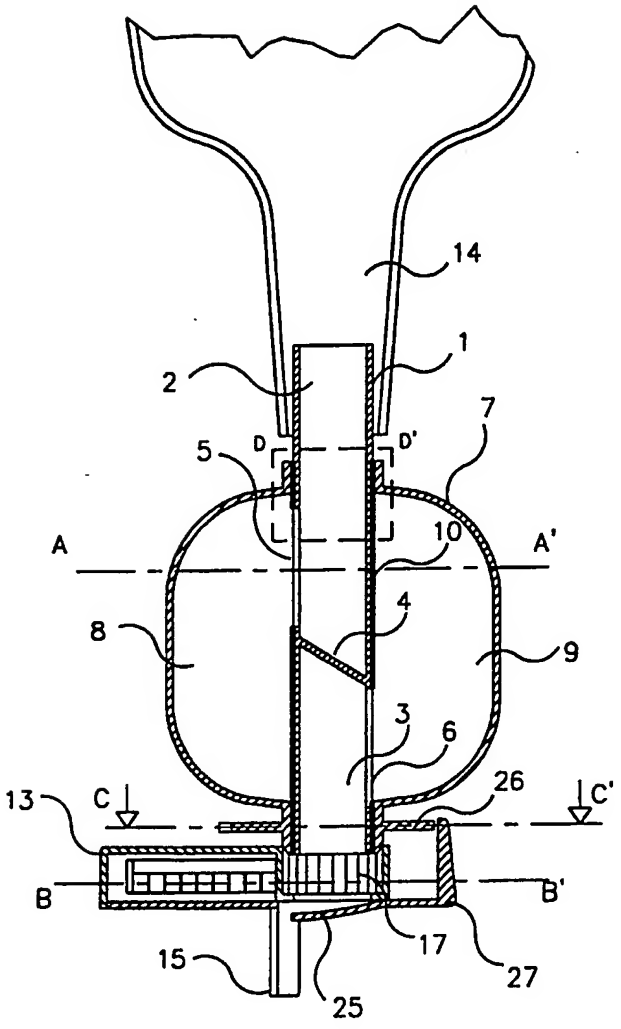


FIGURE 1B

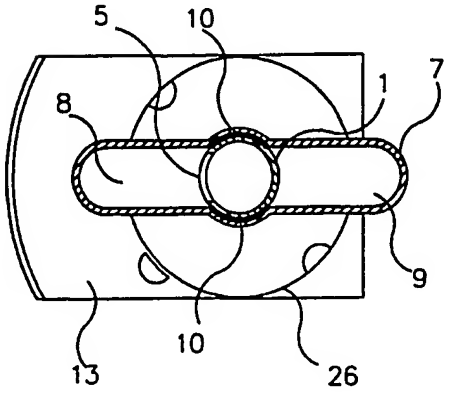
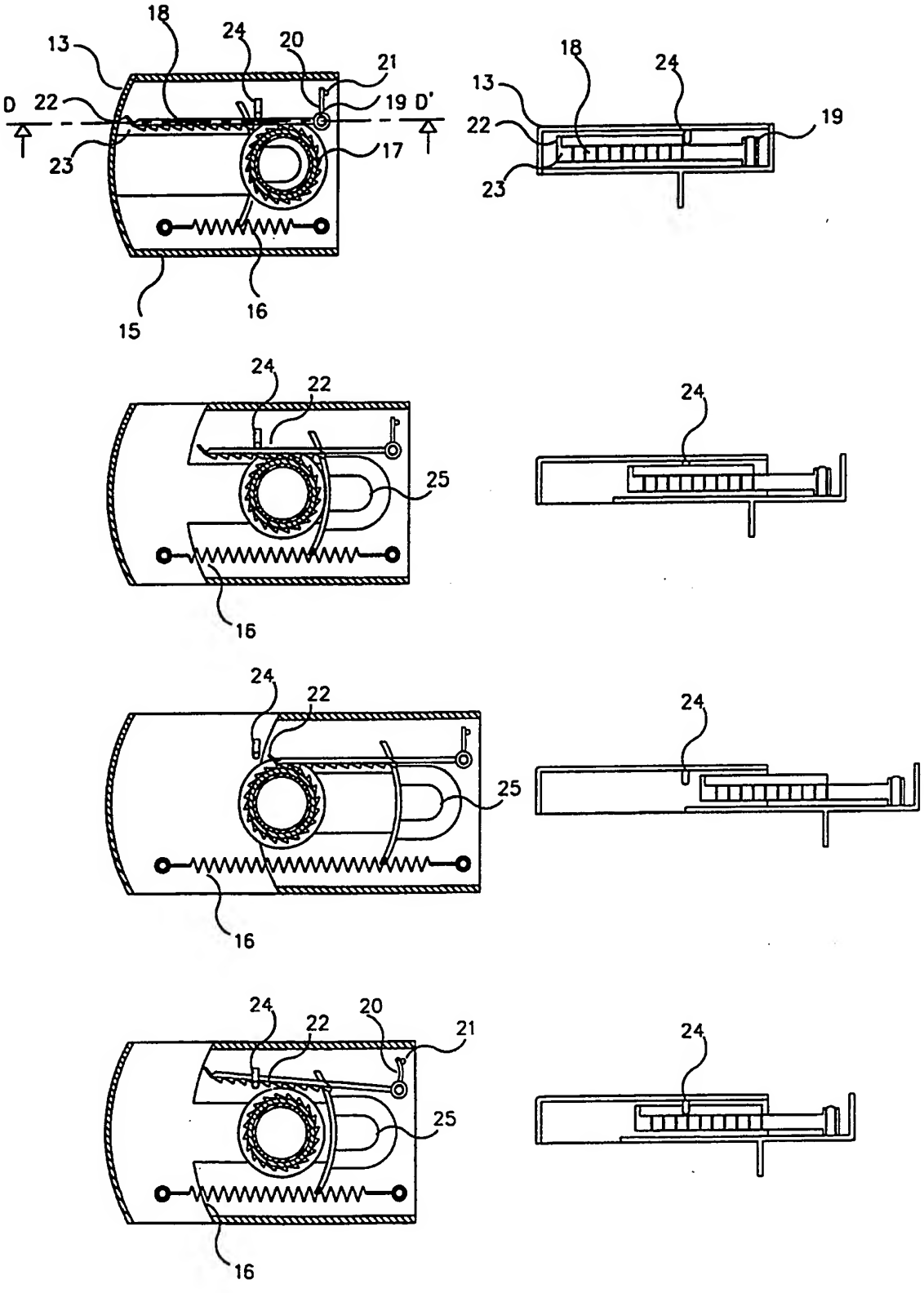


FIGURE 2A


18
13
24
20
21
D
22
19
D'
17
23
15
16
18
24
13
22
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23
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22
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22
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16
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16
24

FIGURE 3A

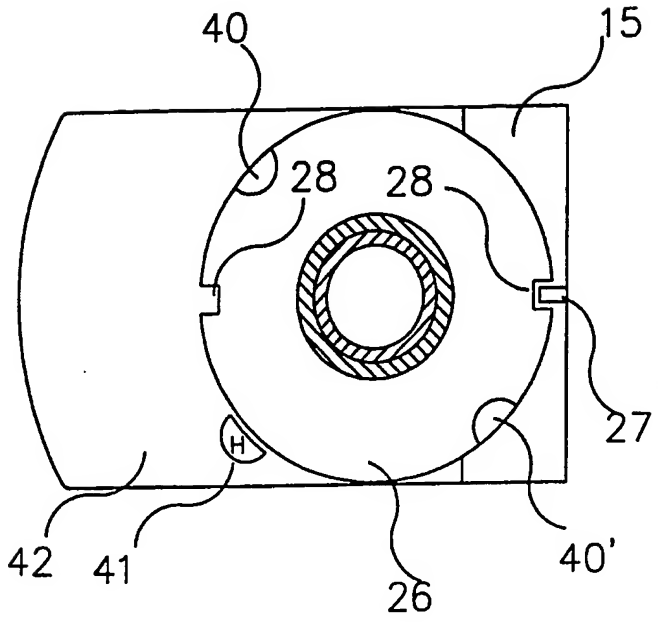


FIGURE 3B

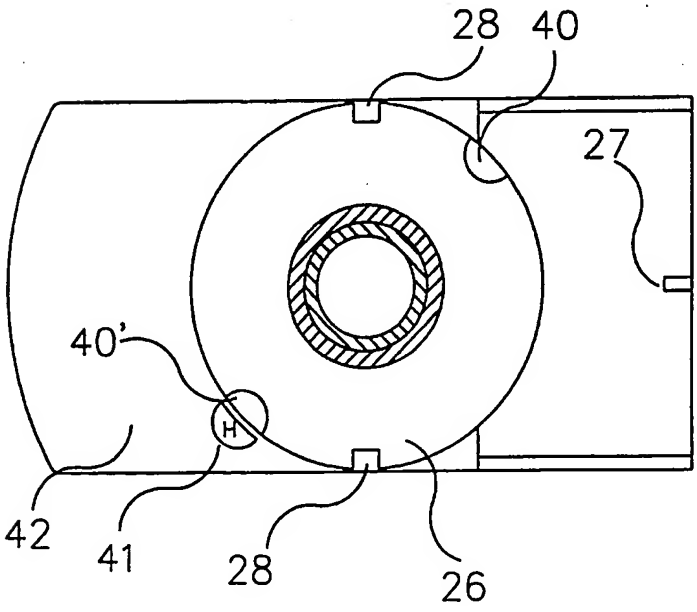


FIGURE 4A

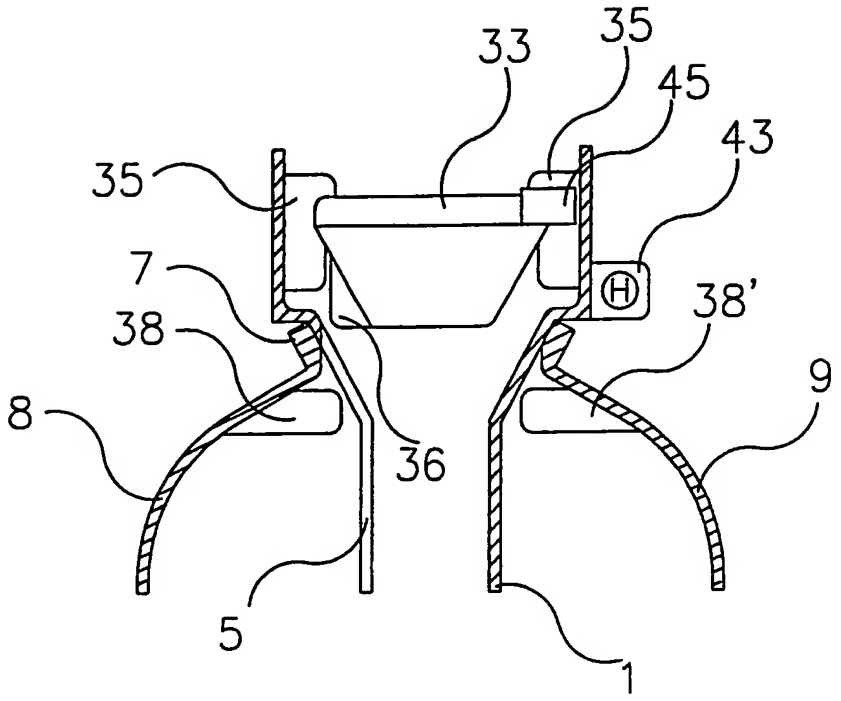


FIGURE 4B

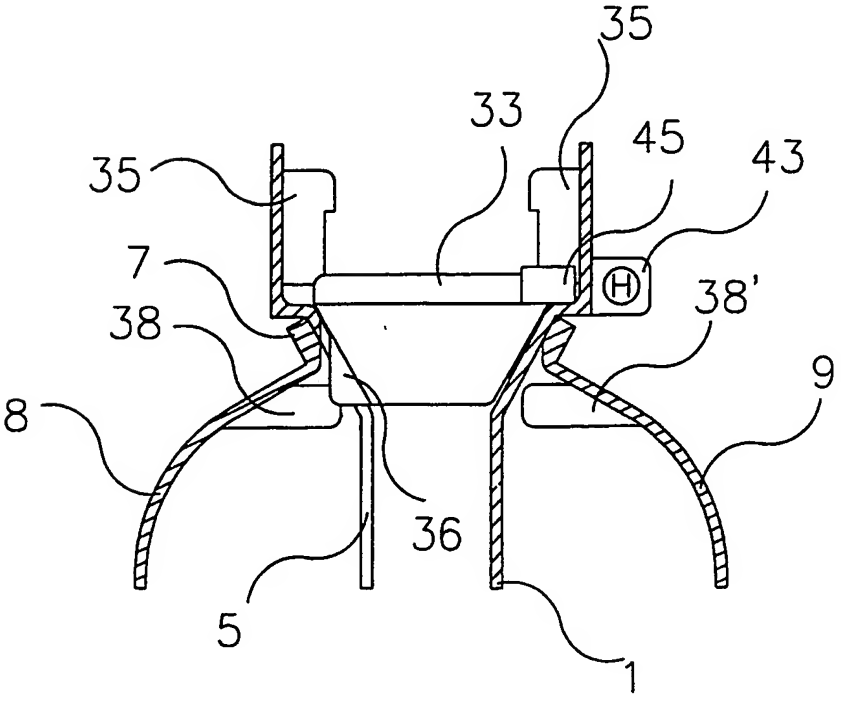


FIGURE 5A

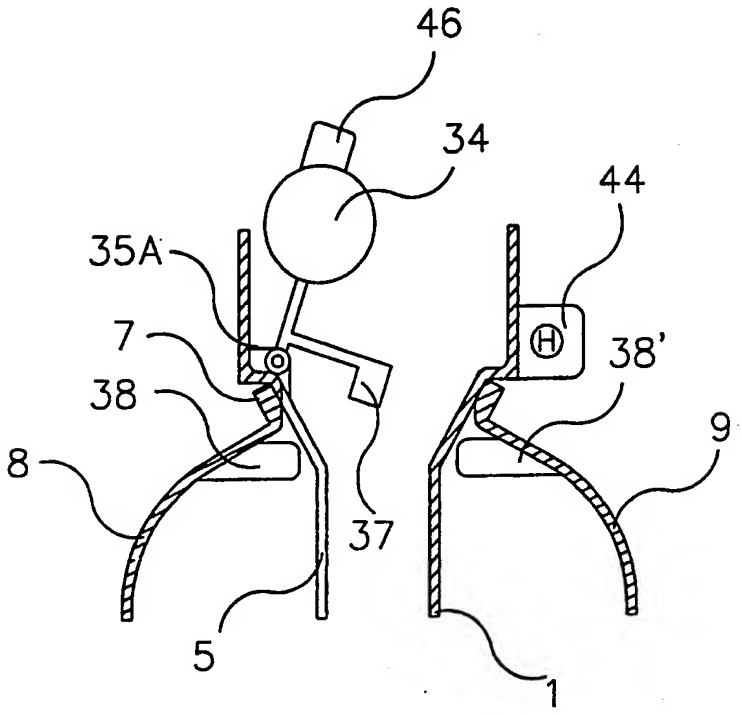


FIGURE 5B

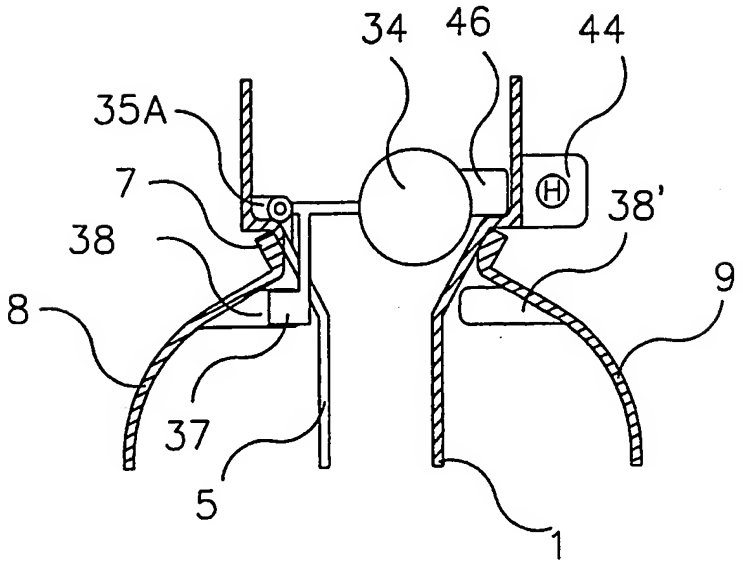


FIGURE 6A

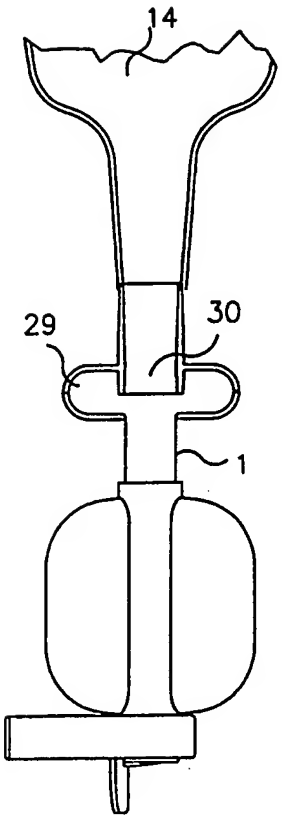


FIGURE 6B

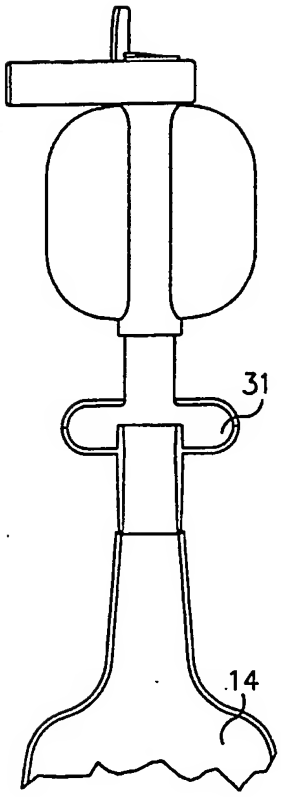


FIGURE 7

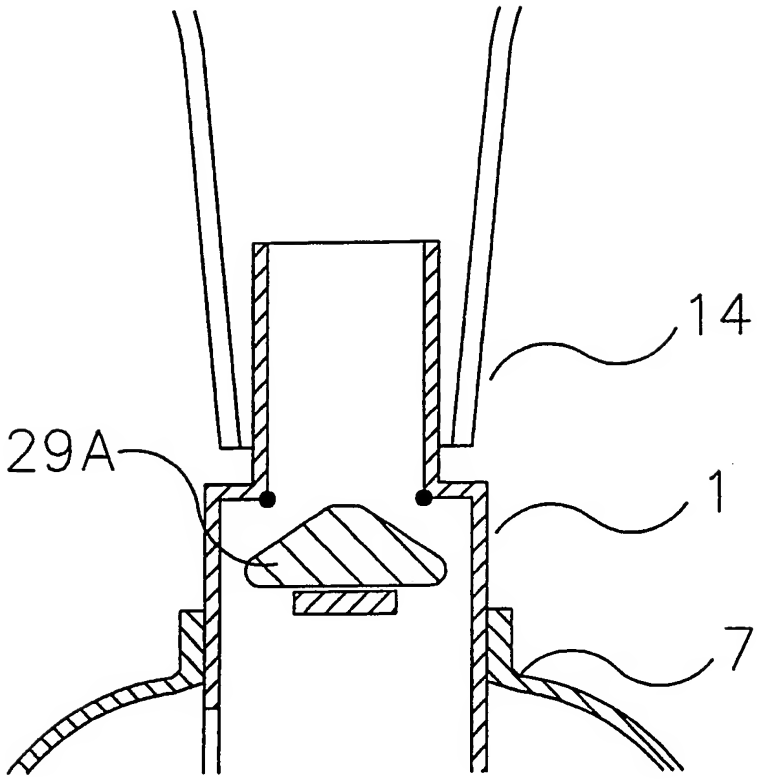


FIGURE 8A

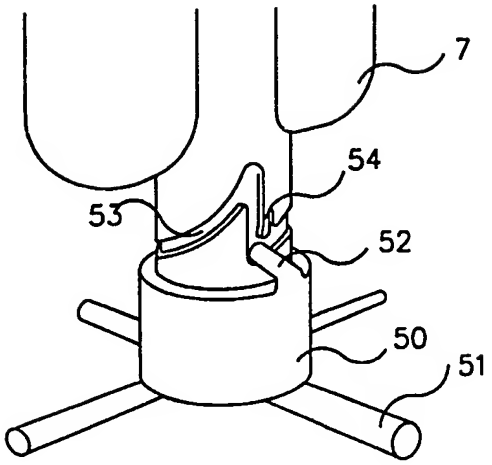


FIGURE 8B

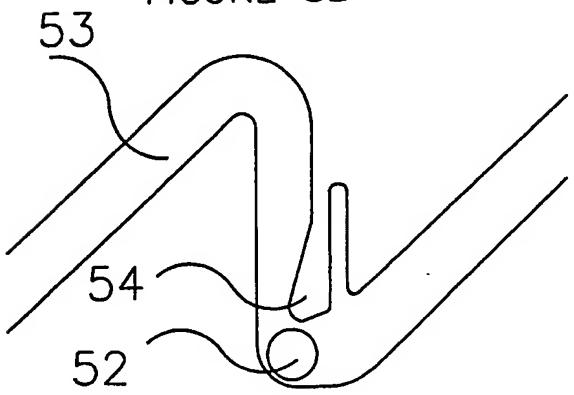
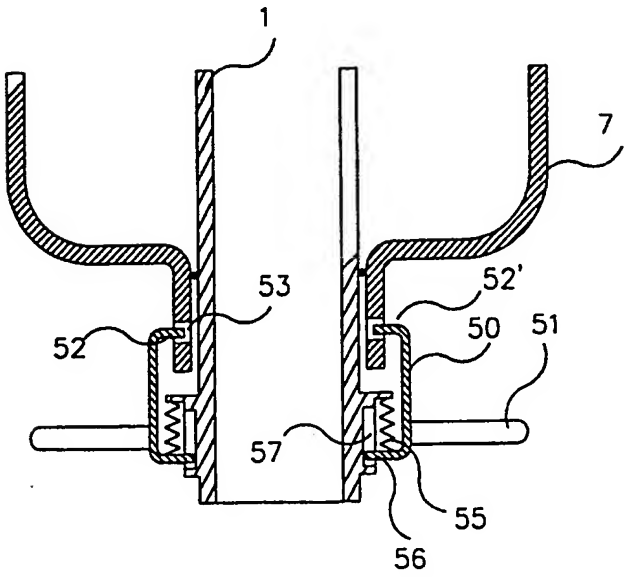


FIGURE 8C



FLUID DISPENSER

2286384

INTRODUCTION

I describe a device for dispensing with speed and consistency predetermined quantities of liquids of various viscosities with means for interlocking the dispensing chambers with the trigger of the device so that the device may not be discharged without operation of the trigger. The dispensing chambers may be made of transparent material, thus allowing users to verify that the device is fully charged with liquid. Once fully charged and triggered, the device cannot be prevented from fully discharging the predetermined quantity. An optional feature prevents the device from being triggered unless sufficient liquid is available fully to recharge the device when next triggered.

The ports in my device may be larger than found in conventional products, thus allowing rapid filling and discharging of the device and facilitating cleaning.

I also describe means for generating an electronic signal on each occasion when the device is triggered and, separately, when its supply reservoir is empty, so facilitating use of the device with electronic data processing stock control systems.

The features of the device make it particularly suitable for use in licensed premises for dispensing lawful measures of alcoholic drinks (here called 'spirit dispensers'); but the device may be also be used wherever there is required accurate delivery of small quantities (say, 10 to 1000cc) of a liquid (or smoothly flowing granular solids such as grain or seeds) *e.g.* in commercial food preparation or an industrial process.

THE INVENTION

According to my invention, a fluid dispenser comprises

- a plurality of chambers of predetermined capacity which collectively rotate around two tubes on the same axis, each such tube having a single port in its side wall positioned so that when one port is aligned with one chamber the other port is aligned with another chamber, the first tube being connected to a supply reservoir and the second tube forming the discharge vent;
- trigger means, acting either on the chambers or on the tubes or partly on both to effect the rotation of the chambers relative to the tubes which trigger is interlocked with the rotating elements of the dispenser; and,
- optionally, means which prevent the rotation of the chambers and tubes relative to each other should there be insufficient liquid available fully to recharge the dispenser when next triggered.

The tubes may but need not abut each other and may comprise a single tube divided into two sections.

In such a dispenser having say, twin chambers, rotation is effected in 180" increments and, at successive incremental rotations, the inlet port in one chamber is, initially, aligned with a port in the first tube, thus allowing that chamber to be charged with liquid from the reservoir (which may but need not be under pressure); and, on a further incremental rotation, the outlet port of the chamber is aligned with the port in the other tube, thus allowing the contents of the chamber to be discharged.

The trigger means may operate in any direction relative to the axis of the tubes.

A DESCRIPTION OF A SPIRIT DISPENSER

My proposed device is particularly suited for dispensing alcoholic drinks in legal measures. I now describe two spirit dispensers made in accordance with my invention, the first with a trigger operating in a direction orthogonal to the axis of the tubes and the other with a trigger operating in the same direction as that axis. My description is made with reference to the following drawings:

Fig 1: (a) a vertical cross section through a mechanically rotated device (omitting, for clarity, the details within area D, D' as shown in Fig 4), and (b) a horizontal cross section through the device at line A,A'.

Fig 2: four horizontal sections B,B' through the trigger illustrating the successive positions of the trigger and interlocked components of

the device with progressive depression of the trigger.

Fig 3: horizontal section C,C' through the interlock device with (a) the interlock disc in the position which obtains when the trigger is in the forward position, and (b) the interlock disc in the position when the trigger is in its depressed position.

Fig 4: enlarged area D, D' of Fig 1 showing a conical, tethered float with (a) a full reservoir, and (b), an empty reservoir.

Fig 5: enlarged area D, D' of Fig 1 showing a pivoted float with (a) a full reservoir, and (b), an empty reservoir.

Fig 6: a buffer reservoir (a) in its normal position and (b) in its inverted position.

Fig 7: a non-return valve.

Fig 8: (a) a general arrangement of a device having a trigger which operates in the same direction as the axis of the tubes; (b) a detail of the compliance means; and (c) a cross section of such a trigger.

In figure 1(a) there is shown a tube 1 which is vertical and divided into upper section 2 and lower section 3 by a generally horizontal partition 4 with a hole or port 5 in the wall of the upper section and a diametrically opposed hole or port 6 in the wall of lower section 3. Mounted concentrically around tube 1 is a revolving housing 7 which encloses twin diametrically opposed chambers 8 and 9 of predetermined volume (typically 25ml). The chambers are isolated from each other by a PTFE seal 10 which also lubricates the revolution of the chambers about tube 1. Housing 7 can be rotated around tube 1 by rotating means 13. The entire device is installed beneath a bottle reservoir 14. When the chambers are rotated over the holes 5 and 6, liquid may flow, firstly, from section 2 of tube 1 into chamber 8 via hole 5 with displaced air rising upwards into reservoir 14; and, secondly, from the chamber 9 via hole 6 through section 3 of tube 1. When the revolving housing 7 is rotated 90 degrees from the starting position, the walls of the revolving housing 7 seal both holes 5 and 6 so that no flow can occur into or out of the chambers 8 or 9 or section 3 of tube 1.

In figure 2, there is shown the rotating means 13 which provides a trigger 15, with its downwardly projecting extension shown in figure 1(a), which slides horizontally between two limits and held at the forward position by spring 16. A cog 17 is concentrically fixed to the lower part of the revolving housing 7. A rack 18 is mounted on the trigger 15 via a pivot 19 which allows the rack to rotate in the horizontal plane. The rack incorporates a leaf spring 20 which bears against peg 21 so as to bias the rack 18 towards cog 17. A compliant flange 22 is fixed to the rack at 23 so as to deflect under pressure towards the cog but be rigid under pressure away from the cog. The dimensions of the cog 17 and the rack 18 are such as to cause the housing 7 to rotate exactly half a revolution on each successive operation of the trigger 15. If pressure on the trigger 15 is withdrawn before half a turn is completed, spring 16 is prevented from turning the housing 7 in the reverse direction by the general friction of the seal 10; and rack 18 is prevented from disengaging by means of peg 21. If pressure is withdrawn from the trigger 15 after a half turn has been completed, as shown in the last illustration in figure 2, the rack is no longer prevented from disengaging from the cog by peg 24 so allowing, firstly, trigger 15 to be pulled back by the spring 16 and, secondly, rack 18 to return to its original position (with compliant flange 22 lifting the rack over peg 24 in this direction only). As the trigger reaches its forward position, an optional drip catcher 25 partially covers the lower end of the discharge section of tube 1.

It will be appreciated that, at successive half revolutions of the housing 7, the chambers 8 and 9 are initially charged with liquid from reservoir 14 and then discharged through section 3 in tube 1 with the full measure always discharged once the discharge process has been triggered.

The rotating means 13 is interlocked with the housing 7 by means of a disc 26 which is fixed to the housing 7 in the position indicated in figure 1(a). The shape of disc 26 is shown in Figure 3(a), with the disc in the position which obtains when the trigger 15 is in its forward position (as shown in the first illustration in figure 2(a). A tooth 27 which forms part of the trigger 15 nests in one of a

pair of niches 28 in disc 26. When the trigger is depressed, the tooth 27 is released from the niche, thus allowing the disc - and also the housing to which it is fixed - to rotate. Figure 3(b) illustrates the disc in the position which obtains when the housing has been rotated through 90 degrees from its starting position.

Figures 4 and 5 illustrate alternative means to prevent the rotation of the chambers and tube relative to each other should there be insufficient liquid in the supply reservoir fully to recharge the device when next triggered. The float placed in the neck of the device - 33 in figure 4 and 34 in Fig 5 - will rise or fall in the presence of liquid in the reservoir 14 (Figures 4(a) and 5(a) illustrating the position when liquid is present in the reservoir and Figures 4(b) and 5(b) illustrating the position when the reservoir is low (the float being positioned so that when it is in the higher position the volume of fluid in the neck of the device is greater than the volume to be dispensed). Tethers (35 in Figure 4A) or a pivot (35A in Figure 5B) retain the orientation of float 33. When the float 33 or 34 falls, a lug 36 or 37 protrudes through port 5 and engages one of a pair of further lugs 38 and 38' on the inside wall of chamber 8 or 9, thus preventing the chamber housing 7 rotating relative to tube 1.

Use of means described in Figures 4 and 5 will trap a part measure in the device. Alternative means to enable that part measure to be conveniently saved during the transfer of the dispenser from one bottle to another are illustrated in Figures 6 and 7. Figure 6 shows a buffer reservoir 29 mounted between the bottle reservoir 14 and the top of the spirit dispenser. When in the normal operating position, fluid flows through orifice 30 into the top of tube 1. When bottle reservoir is empty the system is inverted to allow the dispenser to be transferred to a full bottle / reservoir. On inversion, any fluid remaining in the dispenser flows into annular reservoir 31 and not into the empty bottle. The dispenser may then be transferred to a full bottle and the system returned to its operating position when the fluid in reservoir 31 flows into a chamber through tube 1. Figure 7 shows a simple non-return valve 29A of a type already known in the art of fluid mechanics, which prevents fluid flowing through the neck of the dispenser when inverted. Such a non-return valve may be incorporated into the centre of float 33 in Figure 4.

An electronic pulse may be generated on each occasion when the device is triggered by incorporating into disc 26 a pair of magnets, 40 and 40' in Figure 3(a), which, with the incremental rotation of disc 26, sweep through the field of a commercially available Hall effect device 41 mounted on the case of the trigger mechanism 42. The strength of the magnets is dictated by the operating specification of the Hall effect device and will typically be in the region of 100 to 200 gauss. Such pulse may form the input to an electronic data processing system which monitors the use of the dispenser. Similarly, a low level of fluid in the reservoir may be signalled by a Hall effect device placed on the neck of the dispenser, 43 in Figure 4 and 44 in figure 5, with magnets 45 and 46 of suitable strength being incorporated in the float 33 and 34.

In another version of the device, the trigger mechanism may operate in the same direction as the axis of the tube. Such a trigger mechanism is illustrated in Fig 8 where an upward force on sleeve 50 is applied through trigger arms 51, and transmitted to lug 52 which is directed to slide along groove 53 by compliant flange 54. The sleeve 50 is prevented from rotating about the tube 1 by flange 56 which engages with a groove 57 in tube 1 and so, with the progressive movement of lug 52 along groove 53, chamber housing 7 is forced to rotate about tube 1. When lugs 52 and 52' have reached the highest point of groove 53 and the upward force on trigger arms 51 is discontinued, sleeve 50 falls to its original position past compliant flange 53, the downward movement being assisted by spring 55. It will be appreciated that the chamber housing 7 cannot be rotated without also activating vertical movement of the trigger mechanism.

CLAIMS

1 CLAIM:

1. A fluid dispenser which comprises:

• a plurality of chambers of predetermined capacity which collectively rotate around two tubes on the same axis, each such tube having a single port in its side wall positioned so that when one port is aligned with one chamber the other port is aligned with another chamber, the first tube being connected to a supply reservoir and the second tube forming the discharge vent; and

• trigger means, acting either on the chambers or on the central tubes or partly on both to effect the rotation of the chambers relative to the tubes which trigger is interlocked with the rotating elements of the dispenser.

2. A fluid dispenser in accordance with claim 1 with means which prevent the rotation of the chambers and tubes relative to each other should there be insufficient liquid available fully to recharge the dispenser when next triggered.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9424993.5
Relevant Technical Fields (i) UK Cl (Ed.M) B8N NKB, NKC, NKX (ii) Int Cl (Ed.5) B67D 3/00, G01F 11/22	Search Examiner MR S WALLER Date of completion of Search 16 JANUARY 1995
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE: WPI	Documents considered relevant following a search in respect of Claims :- 1 AND 2

Categories of documents

X:	Document indicating lack of novelty or of inventive step.	P:	Document published on or after the declared priority date but before the filing date of the present application.
Y:	Document indicating lack of inventive step if combined with one or more other documents of the same category.	E:	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A:	Document indicating technological background and/or state of the art.	&:	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
X	GB 0289557 (CHAMBERS)	1

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